

STRUCTURE AND ERUPTIVE CYCLE OF CINDER CONES IN THE PINACATE VOLCANIC FIELD AND THE CONTROLS OF STROMBOLIAN ACTIVITY

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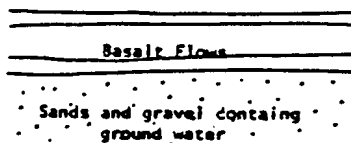
ABSTRACT

Pleistocene basalt flows and related vent facies in the Pinacate volcanic field, Sonora, Mexico, record a four-stage eruptive cycle that is largely or wholly repeated at each of many cinder cones. Basal lava flows (stage 1) commonly preceded initiation of Strombolian cone-building activity. Such basal flows rarely have been reported elsewhere. Occurrence of basal flows at Pinacate cinder cones may reflect sufficiently rapid initial rise of magma as to preclude an incubation period for bubble growth and coalescence to yield large bubbles and explosive activity. Flows accompanied Strombolian eruptions at some localities, but many Pinacate cones were unbreached at the close of the cone-building pyroclastic phase (stage 2) of their eruptive cycles. Continued delivery of magma produced deep lava lakes within unbreached cones; radial dikes and sills emanated from these lakes. Lake level rose until it overtopped cone rims or until one side of weak cone structures gave way and the cone was breached (stage 3). Finally, renewed pyroclastic eruptions (stage 4) yielded small volumes of tephra especially rich in skeletal phenocrysts. These terminal eruptions evidently resulted from resurgent boiling consequent upon rapid growth of phenocrysts in pockets of melt remaining at very shallow depth.

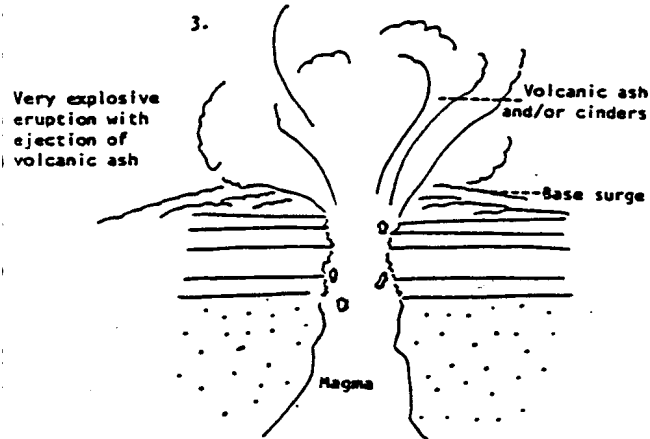
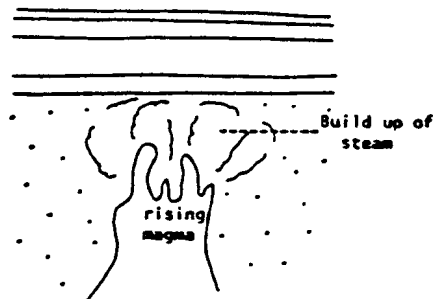
PINACATE VOLCANIC FIELD, NW. SONORA, MEXICO

MODEL FOR THE SEQUENTIAL STAGES IN THE FORMATION OF THE LARGE CRATERS

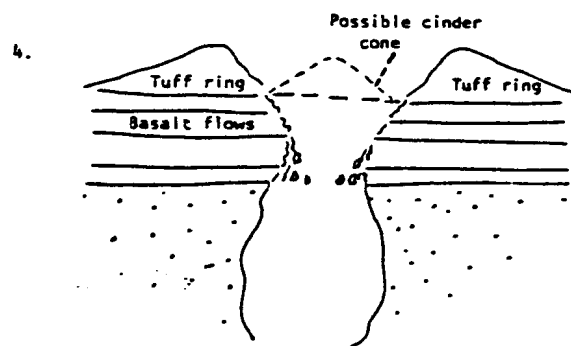
1. Stack of basalt flows on top of sands and gravel containing ground water



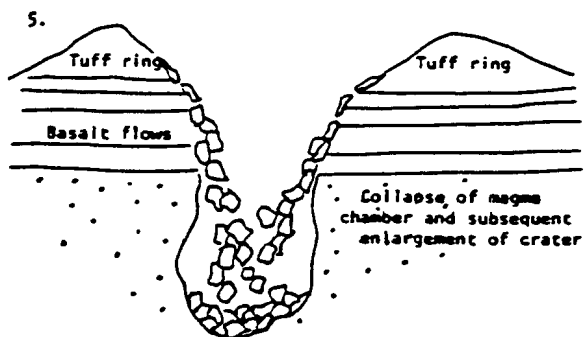
2. Injection of hot magma into grabels plus resulting build up of steam



Possible formation of lave lake and/or cinder cone



Collapse of roof of magma chamber and crater walls, resulting in the enlargement of the crater



Wind blown sand and dust collects in enlarged crater

